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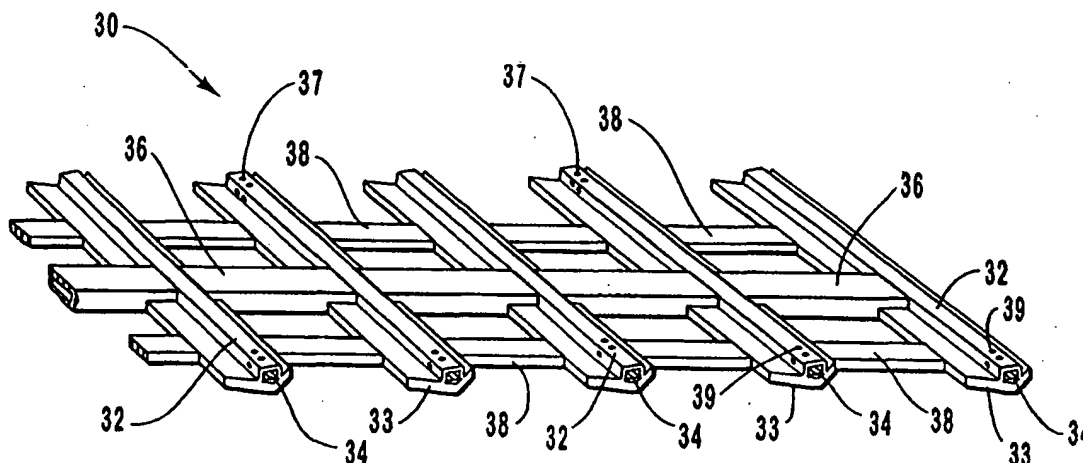
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<p>(21) International Application Number: PCT/US99/21509 (22) International Filing Date: 17 September 1999 (17.09.99) (30) Priority Data: 60/101,064 18 September 1998 (18.09.98) US (71) Applicant (for all designated States except US): THE UNIVERSITY OF UTAH RESEARCH FOUNDATION [US/US]; Suite 110, 615 Arapeen Drive, Salt Lake City, UT 84108 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): FRAZIER, A., Bruno [US/US]; 609 East 7th Avenue, Salt Lake City, UT 84103 (US). BRAZZLE, John, D. [US/US]; 133 West 800 North, Clearfield, UT 84015 (US). (74) Agents: SEELEY, David, O. et al.; Workman, Nydegger &amp; Seeley, 1000 Eagle Gate Tower, 60 East South Temple, Salt Lake City, UT 84111 (US).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report.</p>

(54) Title: SURFACE MICROMACHINED MICRONEEDLES



(57) Abstract

Surface micro-machined micro-needles (32) are formed as single needles (32) or in two-dimensional or three-dimensional micro-needle arrays (30). The micro-needles (32) are fabricated on a substrate (12) which can remain attached to the micro-needles (32) or can be subsequently removed. The two-dimensional or three-dimensional micro-needle arrays (30) can have cross-coupling flow channels (36) which allow for pressure equalization, and balance of fluid flow within the micro-needle arrays (30). Each of the micro-needles (32) has a micro-channel (36) therethrough that provides communication between at least one input port (37) at a proximal end of the micro-needles (32), and at least one output port (39) at an opposite distal end.

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